

E-Parking Coupon Apps

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Abstract— Nowadays, people strives to find a simple way to achieve their goal. In term of car parking fee, the organization gives a great deal of attention when there is a service that provides driver a simple way and saves time for the driver to pay their fee. By using the manual parking coupon system, the driver need to buy their parking coupon at the authorized seller and utilized it as a parking time. The coupon parking indicate that the driver is paid for the parking fee and display it on the dashboard of the car. If the driver need to extend time, they need to walk back to their car to display more parking coupon. This method is wasting the driver's time. Therefore, the aims of this project is to provide a platform for the driver to pay the parking fee by mobile phone. This interactive and user friendly application aims to help the driver to keep track of their parking session time and reduce time to pay for their parking fee. The objectives of this proposed application is to migrate the existing parking system into computerized parking system. By using the proposed system, driver can avoid their car being penalized by the enforcement officer. The methodology used in this proposed application is the Rapid Application Development (RAD) model. The proposed application is developed based on the collected requirements and design.

Keywords – Driver; Parking Coupon; mobile application; extend time; pay parking fee

I. INTRODUCTION

Coupon parking is a system that requires the car owners to purchase advance before they want to use in the parking place. The parking coupon just like a proof of payment when the relevant information was tear off completely and the car owners need to display them in car dashboard. Each coupon only valid for limited time period. So, the car owners need to decide how long the time period they want to use and display the total amount of coupons. If they failed to display the parking coupon or the overtime parking, they might issue by summon. It also takes time to find a parking spot if they meet traffic congestion as they could not find a fastest path to reach their destination. [1] When they park their car far from their destination and the timer runs out, they need to get back to their car quickly, so they might find a shortest path to solve the problem. [2]

The parking lot is owned by the Kuching South City Council which is using the parking coupon as a way to pay for the parking fee. The parking lot is monitored by the enforcement officer on duty. The parking lot only monitored

during the office operation time which is 8 a.m. until 5 p.m. on weekday.

Throughout this project, E-Parking Coupon Apps is proposed. It is alternative way to pay the parking fee by using the mobile application. This mobile application is designed to provide a platform to the car owners to pay the parking fee through pay by phone method.

E- Parking Coupon Apps is an android-based mobile application that allow car owners to make payment easily by registering their vehicle number and account. Through this app, the car owners can choose their vehicle number and parking session that they want to place their car in Kuching area. If the car owners want to extend their parking session, they can open the app and select the time for extend. Through this way, the car owners didn't need to rush to their vehicle for adding more parking coupons to extend the parking session. After parking, they can make their payments online. It can prevent the car owners wasting their time to buying coupon ticket or forget to display the coupon ticket when they park under MBKS and DBKU parking area.

II. LITERATURE REVIEW

A. JomParking App [3]

JomParking is an example of parking payment application and used in Kuala Lumpur. It is a type of application that can be used to pay the parking fee using mobile phone and convenient to use it. This application is targeted to help the vehicle owner to find parking space and make payment through the mobile phone. It can help the driver to save time and skip the pay station. Unlike other application that is use internet banking to pay the parking fee, JomParking is using the token way to top up the money and pay for the parking fee. The driver can share and request the token with their friends or family member. Through this app, the driver also can track and receive the notification of the parking status. There is multi-language can be chosen. Besides, JomParking offer two way of parking method such as on-street parking and off-street parking.

B. SmartParking Melaka App [4]

SmartParking Melaka is another example of on-street parking app in Melaka state introduced by Hang Tuah Jaya

Municipal Council (MPHTJ) and Melaka Historic City Council (MBMB). SmartParking Melaka provides a mobile app for driver to obtain street parking session easily and is convenient to use it at anywhere. This smart parking system offered an option to let the driver who wished to pay the parking fees without using cash. Through this smart system, the driver can make their payments and top up parking charges online by registering their account and vehicle registration numbers. This method is convenient to driver as they can just pay their parking fee and extend parking session at anywhere. The main features of this app are alert expiration, extend time and instant top up. The app can add by multiple cars and help other car to extend time as long as it is register via the apps.

C. *Smart Selangor Parking (SSP) App (Devi,2019)*

Smart Selangor app is another example of parking payment application. It is owned by SSDU Innovations Sdn Bhd and use under Selangor municipal council area. This smart parking app is introduced by 1 July 2018. It not only target to driver but also helps to conserve the environment by reducing the use of paper and ink to print out the parking coupons and tickets. The app consists of several features including scan and pay, transfer credit, payment & reload, manage vehicles and change council. The Smart Selangor Parking allow the driver to pay their parking fee through their mobile phone.

III. REQUIREMENT ANALYSIS AND DESIGN

Rapid Application Development is a software development methodology that is based on prototyping and iterative development. This RAD focus on minimizing the planning stage and maximizing prototype development. The time allocated for the project is short. Therefore, this methodology is chosen to be utilized in this project since RAD can allow the developer to change from time to time and develop the project in short period of time with the rapid prototyping. RAD consist of four phases which are analysis, prototype cycle, testing and implementation.

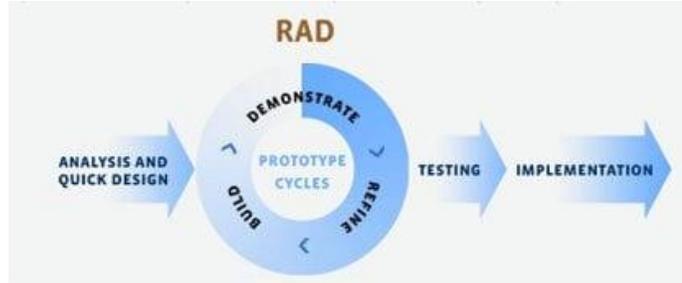


Fig. 1. Phases of RAD methodology [5]

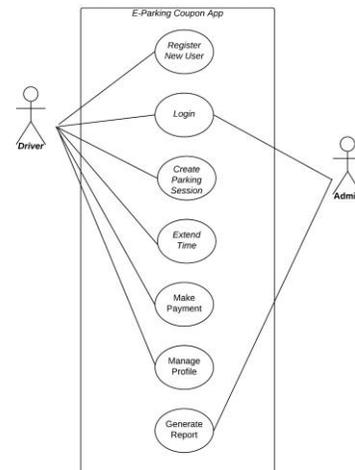
In the analysis phase, the early requirement analysis will be carried out by collecting information from the user. Next, for the prototype cycle, it involves the developing the

prototype, demonstrate and obtain the user feedback and perform the refinement to meet the user requirement. This process is repeated for all the component and function that are included in this project and the testing process only will be done after the result of refinement is good. Once the testing phase is done, it will start the implementation phase which the project is fully functional and ready to be developed to the user's end. To achieve the goals at high quality, the tools will be utilized where RAD uses both computerized tools and human technique.

A. *Phase 1: Analysis*

Analysis phase is combining the system of planning and system analysis of the System Development Life Cycle (SDLC). The study of the user requirement is done in the analysis stage to ensure the proposed system does what it is supposed to do. The process to get user requirement is done through a simple survey. To gather user requirement, the targeted users are questioned regarding to current manual parking coupon system and their opinion on the proposed mobile application system.

B. *User Case Diagram*



C. *Phase 2: Prototype Cycle*

Prototype cycle in RAD methodology is the crucial phase. The process of repeating analysis and prototyping are necessary for prototype cycle which allows rapid prototyping with minimal planning. During this phase, user will work in hand with developers to make sure that they met their requirement at each step within the design phases. The user can provide their opinion and improve the requirement once they view the prototype. There are three steps included in this phases which is build, demonstrate and refine.

D. Phase 3: Testing

There are a few of testing sets that will be done such as functional testing and acceptance testing. The user will test the application in the android mobile phone. Acceptance testing is executed to identify whether the application meet the user requirement. Functional testing is carried out to evaluate the functional requirement listed where it is able to perform all the function needed. Any changes of functionality of the application will be done based on the gathered feedback.

E. Phase 4: Implementation

The application will be delivered to the user and implemented which will be then ready to use. The maintenance of the application system also will be done in this phase. Users will be given a proper training on how to use the mobile application to ensure that the system is fully utilized and there is no uncertainty about the functionality of the application system.

IV. IMPLEMENTATION

This chapter discusses the implementation of the proposed application which based on the design in Chapter 3. Some software component that were used to develop the applications need to installed and configured appropriately before starting the development. The outcome of the application development is shown with screenshots and attached with a brief of description.

A. User Interface

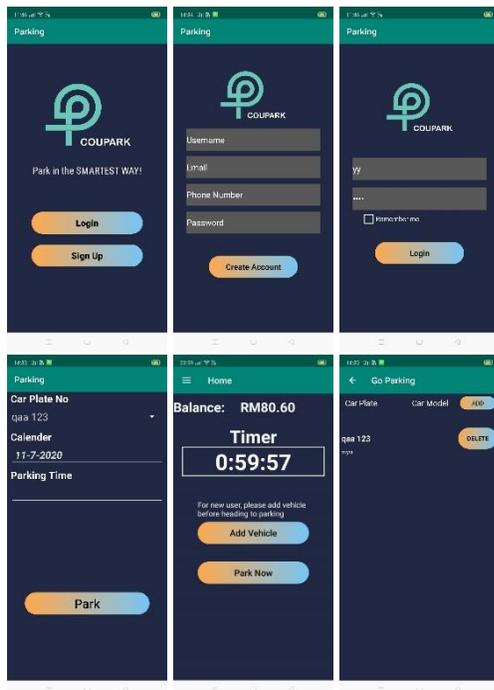


Fig. 2 User Interface of the apps

V. TESTING

This chapter discuss the different types of testing that are carried out to validate and verify the functionality of the proposed application. It is an important process as the developer need to take actions to fix the errors if there exists any bugs or software failure. Besides, testing able to improve

A. Functional Testing

Functional testing is used to test the feature and functionality of the apps will function appropriately. This test evaluates the functional aspect of the application, especially based on the work flow of the application. The functionality of the apps is tested by providing appropriate input and verifying whether the actual result match with the expected result

B. Usability Testing

The application is tested in this process by reviewing it with the respective users. To find the application's weakness, the feedback result from the questionnaire had been recorded and analyzed. The outcome of the feedback would have been used to enhance the application quality for the future work. For reference the sample questions are added in Appendix B. The results are separate to two parts which as part A and part B. Part A is user interface of the apps while part B is testing for the functionality of the apps

VI. CONCLUSION AND FUTURE WORK

This chapter conclude the works done in this project in term of project achievements. The limitation and suggestion improvement for the future work are proposed for the better enhancement.

A. PROJECT ACHIEVEMENT

The objective of this project are listed in Chapter 1 is to migrate the existing parking system into computerized parking system that are more environmental and user friendly and to design a proper time selection for the parking time based on the time zone. The objectives and the achievements are summarized in the Table 1.

Objective	Achievement
To migrate the existing parking system into computerized parking system that are more environmental and user friendly.	CouPark is successfully developed as an application which are more environmental and user friendly.
To design a proper time selection for the parking time based on the time zone.	The time selection in the apps is hourly that make the user easier to choose the desire time rather than setting the time manually.

Table 1. Summaries of objectives and achievements

B. PROJECT LIMITATION

Although the objectives of the projects have been achieved, there are some limitations to the project. This application does not allow the user to do the top up credit since it involves the security problem. Besides, the application cannot display the previous information of the created parking session. Next, the application is unable to extend the parking session during the current parking session is active. In order to extend the parking session, the user need to create a new parking session when the current timer is end. This application only available at DBKU parking zone since it is designed for them and the regulation is based on their organization including the fee rate. There are some bug and error that make the application did not perform well.

C. FUTURE WORK

As for future enhancement, the application should support all kind on payment including the online banking and credit card payment. The apps also should be able to extend the parking session in the future. The apps also can be adding the fingerprint function to login the application and use the QR code to scan the parking fee as it can faster access to the apps. Besides, the apps can be developed more flexible to cover more area, automatic location track and instant parking fee.

D. CONCLUSION

This chapter discuss the development of the mobile apps car parking system. The development of car parking system is proposed to provide a digital platform for the driver to select the parking time duration by phone.

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